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Janet Shibata

PATENT
Customer No. 020991

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of: Lin-Nan LEE, *et al.*	Confirmation No.: 9374
Application No.: 10/816,385	Examiner: HAILU, Kibrom T.
Filed: April 1, 2004	Group Art Unit: 2416
For: FRAMING STRUCTURE FOR DIGITAL BROADCASTING AND INTERACTIVE SERVICES	Customer No.: 20991
Attorney Docket: PD-203051	

APPEAL BRIEF

Dear Sir:

This Appeal Brief is submitted in support of the Notice of Appeal dated June 29, 2009.

I. REAL PARTY IN INTEREST

The DIRECTV Group, Inc. is the real party in interest.

II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals and interferences.

III. STATUS OF THE CLAIMS

Claims 1-21, 50, and 51 are pending in this appeal, in which claims 22-49 are canceled. No claim is allowed. This appeal is therefore taken from the final rejection of claims 1-21, 50, and 51 on March 31, 2009.

IV. STATUS OF AMENDMENTS

All amendments to the claims, the last amendment (amending claims 5, 6, 16, and 17, with the addition of claims 50 and 51) having been made in the response filed September 10, 2008, have been entered.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

The claimed invention addresses problems associated with providing for frame synchronization in broadcast transmission systems.

Independent claim 1 provides for the following:

1. A method for supporting frame synchronization in a digital communication system, the method comprising the steps of:

mapping a codeword specifying framing information of a frame according to a signal constellation to output a data stream (See. e.g., ¶¶ [10], [41], [56]; Figs. 2, 5 (mapper 503), 6 (step 603));

duplicating and demultiplexing the data stream into a first data stream and a second data stream (See. e.g., ¶¶ [10], [56]; Fig. 6 (step 605));

modifying the first data stream according to a predetermined operation (See. e.g., ¶¶ [10], [56]; Figs. 5 (multiplier 505), 6 (step 607));

multiplexing the modified first data stream with the second data stream (See. e.g., ¶¶ [10], [57]; Figs. 5 (multiplexer 507), 6 (step 609)); and

outputting a physical layer signaling header corresponding to the frame based on the multiplexed data streams (See. e.g., ¶¶ [10], [58]-[60]; Figs. 5, 6).

Independent claim 5 provides for the following:

5. A method for supporting frame synchronization in a digital communication system, the method comprising the steps of:

mapping a codeword specifying framing information of a frame according to a signal constellation to output a data stream (See. e.g., ¶¶ [10], [41], [56]; Figs. 2, 5 (mapper 503), 6 (step 603));

duplicating and demultiplexing the data stream into a first data stream and a second data stream (See. e.g., ¶¶ [10], [56]; Fig. 6 (step 605));

modifying the first data stream according to a predetermined operation that includes multiplying the first data stream with {-*a*,} or { *a*}, *a* being a predetermined constant, wherein the sign of the multiplier represents a portion of the framing information (See. e.g., ¶¶ [10], [56]; Figs. 5 (multiplier 505), 6 (step 607));

multiplexing the modified first data stream with the second data stream (See. e.g., ¶¶ [10], [57]; Figs. 5 (multiplexer 507), 6 (step 609)); and

outputting a physical layer signaling header corresponding to the frame based on the multiplexed data streams (See. e.g., ¶¶ [10], [58]-[60]; Figs. 5, 6).

Independent claim 6 provides for the following:

6. A method for supporting frame synchronization in a digital communication system, the method comprising the steps of:

mapping a codeword specifying framing information of a frame according to a signal constellation to output a data stream (See. e.g., ¶¶ [10], [41], [56]; Figs. 2, 5 (mapper 503), 6 (step 603));

duplicating and demultiplexing the data stream into a first data stream and a second data stream (See. e.g., ¶¶ [10], [56]; Fig. 6 (step 605));

modifying the first data stream according to a predetermined operation, wherein bits of the first data stream are interleaved with respective additional bits, the additional bits being phase rotated relative to the bits of the first data stream during modulation (See. e.g., ¶¶ [10], [56]; Figs. 5 (multiplier 505), 6 (step 607));

multiplexing the modified first data stream with the second data stream (See. e.g., ¶¶ [10], [57]; Figs. 5 (multiplexer 507), 6 (step 609)); and

outputting a physical layer signaling header corresponding to the frame based on the multiplexed data streams (See. e.g., ¶¶ [10], [58]-[60]; Figs. 5, 6).

Independent claim 12 provides for the following:

12. An apparatus for supporting frame synchronization in a digital communication system, the apparatus comprising:

a constellation mapper configured to map a codeword specifying framing information of a frame according to a signal constellation to output a data stream, wherein the data stream is demultiplexed into a first data stream and a second data stream (See. e.g., ¶¶ [11], [41], [56]; Figs. 2, 5 (mapper 503), 6 (step 603, 605));

a multiplier coupled to the constellation mapper and configured to modify the first data stream (See. e.g., ¶¶ [11], [56]; Figs. 5 (multiplier 505), 6 (step 607)); and

a multiplexer configured to combine the modified first data stream with the second data stream (See. e.g., ¶¶ [11], [57]; Figs. 5 (multiplexer 507), 6 (step 609)), wherein a physical layer signaling header corresponding to the frame is output based the multiplexed data streams (See. e.g., ¶¶ [11], [58]-[60]; Figs. 5, 6).

Independent claim 16 provides for the following:

16. An apparatus for supporting frame synchronization in a digital communication system, the apparatus comprising:

a constellation mapper configured to map a codeword specifying framing information of a frame according to a signal constellation to output a data stream, wherein the data stream is demultiplexed into a first data stream and a second data stream (See. e.g., ¶¶ [11], [41], [56]; Figs. 2, 5 (mapper 503), 6 (step 603, 605));

a multiplier coupled to the constellation mapper and configured to modify the first data stream by multiplying the first data stream with {-*a*,} or { *a*}, *a* being a predetermined constant, wherein the sign of the multiplier represents a portion of the framing information (See. e.g., ¶¶ [11], [56]; Figs. 5 (multiplier 505), 6 (step 607)); and

a multiplexer configured to combine the modified first data stream with the second data stream (See. e.g., ¶¶ [11], [57]; Figs. 5 (multiplexer 507), 6 (step 609)), wherein a physical layer signaling header corresponding to the frame is output based the multiplexed data streams (See. e.g., ¶¶ [11], [58]-[60]; Figs. 5, 6).

Independent claim 17 provides for the following:

17. An apparatus for supporting frame synchronization in a digital communication system, the apparatus comprising:

a constellation mapper configured to map a codeword specifying framing information of a frame according to a signal constellation to output a data stream, wherein the data stream is demultiplexed into a first data stream and a second data stream (See. e.g., ¶¶ [11], [41], [56]; Figs. 2, 5 (mapper 503), 6 (step 603, 605));

a multiplier coupled to the constellation mapper and configured to modify the first data stream, wherein bits of the first data stream are interleaved with respective additional bits, the additional bits being phase rotated relative to the bits of the first data stream during modulation (See. e.g., ¶¶ [11], [56]; Figs. 5 (multiplier 505), 6 (step 607)); and

a multiplexer configured to combine the modified first data stream with the second data stream (See. e.g., ¶¶ [11], [57]; Figs. 5 (multiplexer 507), 6 (step 609)), wherein a physical layer signaling header corresponding to the frame is output based the multiplexed data streams (See. e.g., ¶¶ [11], [58]-[60]; Figs. 5, 6).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1, 4, 9, 11, 12, 15, 50, and 51 are obvious under 35 U.S.C. § 103 based on *Christodoulides et al.* (US 6,665,361) in view of *Raleigh et al.* (US 6,158,041) and *Kuznicki* (US 5,282,205)?

Whether claims 2, 10, 13, and 21 are obvious under 35 U.S.C. § 103 based on *Christodoulides et al.* (US 6,665,361) in view of *Raleigh et al.* (US 6,158,041) and *Kuznicki* (US 5,282,205) in further view of *Paulter et al.* (US 6,859,503)?

Whether claims 3 and 14 are obvious under 35 U.S.C. § 103 based on *Christodoulides et al.* (US 6,665,361) in view of *Raleigh et al.* (US 6,158,041) and *Kuznicki* (US 5,282,205) in further view of *Mogre et al.* (US 2004/0047433)?

Whether claims 5, 6, 16, and 17 are obvious under 35 U.S.C. § 103 based on *Christodoulides et al.* (US 6,665,361) in view of *Raleigh et al.* (US 6,158,041) and *Kuznicki* (US 5,282,205) in further view of *Gardner* (US 5,627,499)?

Whether claims 7 and 18 are obvious under 35 U.S.C. § 103 based on *Christodoulides et al.* (US 6,665,361) in view of *Raleigh et al.* (US 6,158,041) and *Kuznicki* (US 5,282,205) in further view of *Kim et al.* (US 6,851,085)?

Whether claims 8 and 19 are obvious under 35 U.S.C. § 103 based on *Christodoulides et al.* (US 6,665,361) in view of *Raleigh et al.* (US 6,158,041) and *Kuznicki* (US 5,282,205) in further view of *Love et al.* (US 7,158,482)?

VII. ARGUMENT

A. CLAIMS 1, 4, 9, 11, 12, 15, 50, AND 51 ARE NOT RENDERED OBVIOUS BY *CHRISTODOULIDES ET AL., RALEIGH ET AL.*, AND *KUZNICKI* BECAUSE THERE IS NO "MAPPING A CODEWORD SPECIFYING FRAMING INFORMATION OF A FRAME ACCORDING TO A SIGNAL

CONSTELLATION TO OUTPUT A DATA STREAM" AND "DUPLICATING AND DEMULTIPLEXING THE DATA STREAM INTO A FIRST DATA STREAM AND A SECOND DATA STREAM" TAUGHT IN THE APPLIED REFERENCES.

The initial burden of establishing a *prima facie* basis to deny patentability to a claimed invention under any statutory provision always rests upon the Examiner. *In re Mayne*, 104 F.3d 1339, 41 USPQ2d 1451 (Fed .Cir. 1997); *In re Deuel*, 51 F.3d 1552, 34 USPQ2d 1210 (Fed. Cir. 1995); *In re Bell*, 991 F.2d 781, 26 USPQ2d 1529 (Fed. Cir. 1993); *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In rejecting a claim under 35 U.S.C. § 103, the Examiner is required to provide a factual basis to support the obviousness conclusion. *In re Warner*, 379 F.2d 1011, 154 USPQ 173 (CCPA 1967); *In re Lunsford*, 357 F.2d 385, 148 USPQ 721 (CCPA 1966); *In re Freed*, 425 F.2d 785, 165 USPQ 570 (CCPA 1970).

Independent claim 1 recites, *inter alia*, "mapping a codeword specifying framing information of a frame according to a signal constellation to output a data stream; **duplicating** and demultiplexing the data stream into a first data stream and a second data stream" (emphasis added). Independent claim 12 recites "a constellation mapper configured to map a codeword specifying framing information of a frame according to a signal constellation to output a data stream, wherein the data stream is demultiplexed into a first data stream and a second data stream," "a multiplier coupled to the constellation mapper and configured to **modify the first data stream**," and "a multiplexer configured to **combine the modified first data stream with the second data stream**, wherein a physical layer signaling header corresponding to the frame is output based the multiplexed data streams" (emphasis added).

The Examiner relies on *Christodoulides et al.*, specifically Fig. 5, col. 5, lines 43-48 and 56-58, and col. 5, line 66-col. 6, line 6, for a teaching of these claimed features. The cited portions and figures of the reference provide for the following:

> [lines 43-48] Each frame F carries a header containing a unique word (UW), comprising a predetermined sequence of 40 symbols, to assist in acquiring the signal and determining the signal type. The unique word symbols comprise only two bits, mapped onto the most protected bits u_1, U_3 of the 16 QAM constellation.
>
> [lines 56-58] The unique word comprises a data unique word UW_D which indicates that the body of the frame F contains user data.
>
> [Col. 5, line 66-col. 6, line 6] As shown in FIG. 6b, the data symbols in each frame comprise two subframes SF_1 and SF_2 each comprising 596 symbols of encoded data generated by the encoder 28. As shown in FIG. 6c, each subframe SF is generated by the encoder 28 from a corresponding multiplexed frame MF_1, MF_2 output from the multiplexer 24 through the scrambler 26, comprising 1184 data bits D and 48 signalling unit bits SU.

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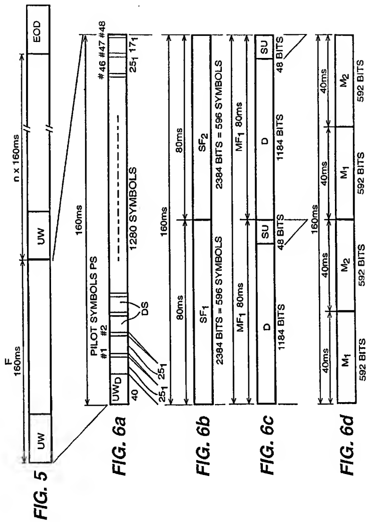

It is not clear to Appellants, either from the explanations provided in the respective Office Actions or from Appellants' own analysis, exactly how these cited passages and figures of

Christodoulides et al. are considered to teach the claimed recitations: "mapping a codeword specifying framing information of a frame according to a signal constellation to output a data stream; duplicating and demultiplexing the data stream into a first data stream and a second data stream" and "a constellation mapper configured to map a codeword specifying framing information of a frame according to a signal constellation to output a data stream, wherein the data stream is demultiplexed into a first data stream and a second data stream." The only "mapping" recited in those passages relates to mapping a two bit unique word symbol onto the most protected bits u_1, U_3 of the 16 QAM constellation. Such a mapping fails to disclose or render obvious the respective mapping recitations set forth in the rejected claims.

If the Examiner is taking the position that the claimed mapping process, e.g., "mapping a codeword specifying framing information of a frame according to a signal constellation to output a data stream," is no different than the mapping process of *Christodoulides et al.* implemented by the QAM modulator 32, Appellants respectfully disagree. The QAM modulator 32 of *Christodoulides et al.* is depicted in FIG. 2a, where it receives symbols from transmit synchroniser 30 and the UW symbols are mapped onto the most protected bits of the 16 QAM constellation by the QAM modulator. This does not constitute "mapping a codeword specifying framing information of a frame according to a signal constellation to output a data stream; duplicating and demultiplexing the data stream into a first data stream and a second data stream" or "a constellation mapper configured to map a codeword specifying framing information of a frame according to a signal constellation to output a data stream, wherein the data stream is demultiplexed into a first data stream and a second data stream."

To the extent the Examiner finds the claimed duplicated first data stream and second data stream in the subframes SF_1 and SF_2 of *Christodoulides et al.*, Appellants point out that in

Christodoulides et al., the subframes SF_1 and SF_2 are first generated at turbo encoder 28 (FIG. 2a) and are only then applied to transmit synchroniser 30, the output of which is passed to the QAM modulator 32 for mapping the bits onto the QAM constellation. Because subframes SF_1 and SF_2 are first generated and then passed on for a mapping operation at a later time, the subframes SF_1 and SF_2 cannot constitute first and second data streams such that there is a "mapping a codeword specifying framing information of a frame according to a signal constellation to output a data stream" and then a "duplicating and demultiplexing the data stream into a first data stream and a second data stream," or "a constellation mapper configured to map a codeword specifying framing information of a frame according to a signal constellation to output a data stream, wherein the data stream is" then "demultiplexed into a first data stream and a second data stream."

Moreover, subframes SF_1 and SF_2 of *Christodoulides et al.* are not duplicated and demultiplexed data streams, as claimed. While each subframe SF comprises 596 symbols of encoded data generated by encoder 28, an equivalent number of symbols does not make for duplicate data streams, and there is absolutely no teaching or suggestion within *Christodoulides et al.* that subframes SF_1 and SF_2 are **duplicates** of one another. In fact, there would have been no reason to make these subframes duplicate data streams, or to include duplicate data streams into each subframe because this would entail the use of increased processing resources with no foreseeable attendant advantage for expending such extra resources.

Raleigh et al., applied for an alleged teaching of modifying a first data stream according to a predetermined operation and multiplexing the first data stream with the second data stream, and *Kuznicki*, applied for an alleged teaching of a codeword specifying frame information, do not provide for the deficiencies of *Christodoulides et al.*, noted above.

In the Advisory Action of June 8, 2009, the Examiner asserts that the duplication and demultiplexing of the data stream into first and second data streams "is simply dividing the frame or data stream into two equal subframes or streams…" The Examiner again points to col. 5, line 66[sic] through col. 6, line 6 of *Christodoulides et al.* for support.

First, Appellants reiterate that the cited portion of *Christodoulides et al.* merely discloses that the two subframes have an identical number, 596, of symbols of encoded data. Having an identical number of symbols of encoded data does not, necessarily, equate to **duplicate** data streams. As depicted in FIG. 6 and described in paragraph [56] of the instant application, in step 605, **the 32 BPSK symbols are "duplicated** and demultiplexed into two coded data blocks." Thus, in accordance with the claimed invention, it is not merely that the two data streams have an equivalent number of symbols therein, but the actual symbols, themselves, the 32 BPSK symbols in the example, must be duplicated. This is much different than the two subframes of *Christodoulides et al.* having an identical number of symbols because there is no teaching that the two subframes described in *Christodoulides et al.* necessarily comprise the exact same values of those symbols.

Second, the Examiner has offered no evidence to substantiate the claim that duplication and demultiplexing of the data stream into first and second data streams "is simply dividing the frame or data stream into two equal subframes or streams…." Clearly, there is no factual support in *Christodoulides et al.* that a data stream is **duplicated** and demultiplexed into first and second data streams.

At page 2 of the Final Rejection, the Examiner contends that the instant claims do not require the first and second data streams to be "exactly the same" and only requires the output data to be divided into two data streams. Appellants disagree. Independent claim 1, for example,

recites "**duplicating** and demultiplexing the data stream into a first data stream and a second data stream." The common meaning of "duplicating" is to "repeat" or "replicate." Thus, contrary to the Examiner's assertion, the claims do, in fact, require the first and second data streams to be "exactly the same" because the data stream is duplicated (as well as demultiplexed) into a first data stream and a second data stream. Thus, the first data stream and second data stream are duplicates of, i.e., exactly the same as, the original data stream and, as such, are also duplicates of each other. There is no other reasonable interpretation of the claim language, especially when viewed in light of the disclosure.

Moreover, there is no suggestion for the proposed combination of references. Even assuming, *arguendo*, that *Raleigh et al.* teaches modifying a first data stream according to a predetermined operation and multiplexing the first data stream with the second data stream, there would have been no suggestion, other than the hindsight provided by Appellants' disclosure, to modify **only one** of the two subframes of *Christodoulides et al.* according to a predetermined operation, and then multiplex that modified subframe, or first data stream, with the second subframe.

While independent claim 12 does not recite the "duplicating" feature, the claim does require a modification of only the first data stream and combining this modified first data stream with the unmodified second data stream. As noted above, neither *Christodoulides et al.* nor *Christodoulides et al.* discloses this feature but, to the extent *Raleigh et al.* may be considered to suggest modifying a first data stream according to a predetermined operation and multiplexing the first data stream with the second data stream, there would have been no suggestion, other than the hindsight provided by Appellants' disclosure, to modify **only one** of the two subframes

of *Christodoulides et al.* according to a predetermined operation, and then multiplex that modified subframe, or first data stream, with the second subframe.

Accordingly, no *prima facie* case of obviousness has been established with regard to the subject matter of claims 1, 4, 9, 11, 12, 15, 50, and 51. Therefore, the Honorable Board is respectfully requested to reverse the Examiner's rejection of claims 1, 4, 9, 11, 12, 15, 50, and 51 under 35 U.S.C. § 103.

B. CLAIMS 2, 10, 13, AND 21 ARE NOT RENDERED OBVIOUS BY *CHRISTODOULIDES ET AL., RALEIGH ET AL.,* AND *KUZNICKI* IN VIEW OF *PAULTER ET AL.* BECAUSE *PAULTER ET AL.* DOES NOT PROVIDE FOR THE DEFICIENCIES OF THE OTHER THREE REFERENCES.

Paulter et al., applied for an alleged teaching of a signal constellation independent of a modulation scheme of the frame, does not provide for the deficiencies of the other applied references, as noted above.

Accordingly, no *prima facie* case of obviousness has been established with regard to the subject matter of claims 2, 10, 13, and 21. Therefore, the Honorable Board is respectfully requested to reverse the Examiner's rejection of claims 2, 10, 13, and 21 under 35 U.S.C. § 103.

C. CLAIMS 3 AND 14 ARE NOT RENDERED OBVIOUS BY *CHRISTODOULIDES ET AL., RALEIGH ET AL.,* AND *KUZNICKI* IN VIEW OF *MOGRE ET AL.* BECAUSE *MOGRE ET AL.* DOES NOT PROVIDE FOR THE DEFICIENCIES OF THE OTHER THREE REFERENCES.

Mogre et al., applied for an alleged teaching of a frame being a Low Density Parity Check (LDPC) coded frame, does not provide for the deficiencies of the other applied references, as noted above.

Accordingly, no *prima facie* case of obviousness has been established with regard to the subject matter of claims 3 and 14. Therefore, the Honorable Board is respectfully requested to reverse the Examiner's rejection of claims 3 and 14 under 35 U.S.C. § 103.

D. CLAIMS 5, 6, 16, AND 17 ARE NOT RENDERED OBVIOUS BY *CHRISTODOULIDES ET AL., RALEIGH ET AL.,* AND *KUZNICKI* IN VIEW OF *GARDNER* BECAUSE *GARDNER* DOES NOT PROVIDE FOR THE DEFICIENCIES OF THE OTHER THREE REFERENCES.

Independent claims 5 and 6 recite, *inter alia*, "**duplicating** and demultiplexing the data stream into a first data stream and a second data stream" (emphasis added). For the reasons above, none of *Christodoulides et al., Raleigh et al.,* or *Kuznicki* teaches or suggests dividing the data stream into two duplicate first and second data streams. *Gardner*, applied for an alleged teaching of the sign of a multiplier representing a portion of framing information, bits of a first data stream interleaved with respective additional bits, and additional bits being phase rotated relative to the bits of the first data stream during modulation, similarly fails to provide for the deficiencies of the other references as noted above.

Accordingly, no *prima facie* case of obviousness has been established with regard to the subject matter of claims 5 and 6. Therefore, the Honorable Board is respectfully requested to reverse the Examiner's rejection of claims 5 and 6 under 35 U.S.C. § 103.

With regard to independent claims 16 and 17, claim 16 recites, *inter alia*, "a multiplier coupled to the constellation mapper and configured to **modify the first data stream** by multiplying the first data stream with $\{-a,\}$ or $\{ a\}$, a being a predetermined constant, wherein the sign of the multiplier represents a portion of the framing information" and "a multiplexer configured to combine **the modified first data stream** with the second data stream, wherein a

physical layer signaling header corresponding to the frame is output based the multiplexed data streams" (emphasis added). Independent claim 17 recites, *inter alia*, "a multiplier coupled to the constellation mapper and configured **to modify the first data stream**, wherein bits of the first data stream are interleaved with respective additional bits, the additional bits being phase rotated relative to the bits of the first data stream during modulation" and "a multiplexer configured to combine **the modified first data stream** with the second data stream, wherein a physical layer signaling header corresponding to the frame is output based the multiplexed data streams" (emphasis added).

Thus, according to claims 16 and 17 the first data stream must be modified and then the modified first data stream is combined with the second data stream. The Examiner admits that this feature is absent from *Christodoulides et al.*, relying on *Raleigh et al.* to allegedly provide such a feature. However, while *Raleigh et al.* modifies Q data (by multiplying by i) and combines this with I data, the I (in-phase components of a modulation signal) data and Q (quadrature components of the modulation signal) data of *Raleigh et al.* do not constitute first and second data streams **that are derived from demultiplexing a data stream derived from a constellation mapper** configured to map a codeword specifying framing information of a frame according to a signal constellation, as claimed. In particular, as seen in FIG. 2 of *Raleigh et al.*, while the I data from PAM constellation map 220a may modify Q data output from PAM constellation map 220b in multiplier 222, the I and Q data streams are not "derived from demultiplexing a data stream derived from a constellation mapper configured to map a codeword specifying framing information of a frame according to a signal constellation." Demultiplexing refers to separating a combined data stream into two data streams or channels. While I and Q in *Raleigh et al.* may have originally been derived by demultiplexing a combined signal into an I

channel and a Q channel (sometime prior to the I and Q data being input to encoders 210a and 210b, respectively), the original data stream that was demultiplexed is not derived from a constellation mapper because the constellation mappers 220a and 220b in *Raleigh et al.* appear **after** any demultiplexing into I and Q data streams. In accordance with the claim language (claims 16 and 17), the data stream that is multiplexed must derive from the constellation mapper and not feed into it, as is apparently done in *Raleigh et al.* Accordingly, other than impermissible hindsight gleaned from Appellants' own disclosure, there would have been no suggestion that would have led the skilled artisan to modify *Christodoulides et al.* in such a manner to modify **only one** of the first and second subframes and then combine that modified subframe with the unmodified subframe, wherein a physical layer signaling header corresponding to the frame is output based the multiplexed data streams.

Neither *Kuznicki* nor *Gardner*, or the combination thereof, provides for the deficiencies of *Christodoulides et al.* and/or*Raleigh et al.* Accordingly, no *prima facie* case of obviousness has been established with regard to the subject matter of claims 16 and 17. Therefore, the Honorable Board is respectfully requested to reverse the Examiner's rejection of claims 16 and 17 under 35 U.S.C. § 103.

E. CLAIMS 7 AND 18 ARE NOT RENDERED OBVIOUS BY *CHRISTODOULIDES ET AL.*, *RALEIGH ET AL.*, AND *KUZNICKI* IN VIEW OF *KIM ET AL.* BECAUSE *KIM ET AL.* DOES NOT PROVIDE FOR THE DEFICIENCIES OF THE OTHER THREE REFERENCES.

Kim et al., applied for an alleged teaching of generating a code word according to a first order Reed-Muller, does not provide for the deficiencies of the other applied references, as noted above.

Accordingly, no *prima facie* case of obviousness has been established with regard to the subject matter of claims 7 and 18. Therefore, the Honorable Board is respectfully requested to reverse the Examiner's rejection of claims 7 and 18 under 35 U.S.C. § 103.

F. CLAIMS 8 AND 19 ARE NOT RENDERED OBVIOUS BY *CHRISTODOULIDES ET AL.*, *RALEIGH ET AL.*, AND *KUZNICKI* IN VIEW OF *LOVE ET AL.* BECAUSE *LOVE ET AL.* DOES NOT PROVIDE FOR THE DEFICIENCIES OF THE OTHER THREE REFERENCES.

Love et al., applied for an alleged teaching of framing information specifying a modulation scheme and a coding scheme, does not provide for the deficiencies of the other applied references, as noted above.

Accordingly, no *prima facie* case of obviousness has been established with regard to the subject matter of claims 8 and 19. Therefore, the Honorable Board is respectfully requested to reverse the Examiner's rejection of claims 8 and 19 under 35 U.S.C. § 103.

VIII. CONCLUSION AND PRAYER FOR RELIEF

For the foregoing reasons, Appellants request the Honorable Board to reverse each of the Examiner's rejections.

To the extent necessary, a petition for an extension of time under 37 C.F.R. §1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Applicant's Deposit Account 50-0383 and please credit any excess fees to such deposit account.

Respectfully Submitted,

Todd Snyder, Registration No. 41,320
Attorney for Applicants

Date: August 24, 2009

The DIRECTV Group, Inc.
CA / LA1 / A109
2230 E. Imperial Highway
El Segundo, CA 90245

Telephone: (310) 964-0560

IX. CLAIMS APPENDIX

1. (Original) A method for supporting frame synchronization in a digital communication system, the method comprising the steps of:

mapping a codeword specifying framing information of a frame according to a signal constellation to output a data stream;

duplicating and demultiplexing the data stream into a first data stream and a second data stream;

modifying the first data stream according to a predetermined operation;

multiplexing the modified first data stream with the second data stream; and

outputting a physical layer signaling header corresponding to the frame based on the multiplexed data streams.

2. (Original) A method according to claim 1, wherein the signal constellation is independent of a modulation scheme of the frame.

3. (Original) A method according to claim 1, wherein the frame is a Low Density Parity Check (LDPC) coded frame.

4. (Original) A method according to claim 1, wherein the predetermined operation includes multiplying the first data stream with $\{-a,\}$ or $\{ a\}$, a being a predetermined constant.

5. (Previously Presented) A method for supporting frame synchronization in a digital communication system, the method comprising the steps of:

mapping a codeword specifying framing information of a frame according to a signal constellation to output a data stream;

duplicating and demultiplexing the data stream into a first data stream and a second data stream;

modifying the first data stream according to a predetermined operation that includes multiplying the first data stream with $\{-a,\}$ or $\{ a\}$, a being a predetermined constant, wherein the sign of the multiplier represents a portion of the framing information;

multiplexing the modified first data stream with the second data stream; and

outputting a physical layer signaling header corresponding to the frame based on the multiplexed data streams.

6. (Previously Presented) A method for supporting frame synchronization in a digital communication system, the method comprising the steps of:

mapping a codeword specifying framing information of a frame according to a signal constellation to output a data stream;

duplicating and demultiplexing the data stream into a first data stream and a second data stream;

modifying the first data stream according to a predetermined operation, wherein bits of the first data stream are interleaved with respective additional bits, the additional bits being phase rotated relative to the bits of the first data stream during modulation;

multiplexing the modified first data stream with the second data stream; and

outputting a physical layer signaling header corresponding to the frame based on the multiplexed data streams.

7. (Original) A method according to claim 1, further comprising the step of:

generating the codeword according to a first order Reed-Muller code.

8. (Original) A method according to claim 1, wherein the framing information specifies a modulation scheme, and a coding scheme.

9. (Original) A method according to claim 1, further comprising the step of:

scrambling the multiplexed data streams.

10. (Original) A method according to claim 1, wherein the signal constellation is according to a Binary Phase Shift Keying (BPSK) scheme.

11. (Original) A computer-readable medium bearing instructions for supporting frame synchronization in a digital communication system, said instruction, being arranged, upon execution, to cause one or more processors to perform the method of claim 1.

12. (Original) An apparatus for supporting frame synchronization in a digital communication system, the apparatus comprising:

a constellation mapper configured to map a codeword specifying framing information of a frame according to a signal constellation to output a data stream, wherein the data stream is demultiplexed into a first data stream and a second data stream;

a multiplier coupled to the constellation mapper and configured to modify the first data stream; and

a multiplexer configured to combine the modified first data stream with the second data stream, wherein a physical layer signaling header corresponding to the frame is output based the multiplexed data streams.

13. (Original) An apparatus according to claim 12, wherein the signal constellation is independent of a modulation scheme of the frame.

14. (Original) An apparatus according to claim 12, wherein the frame is a Low Density Parity Check (LDPC) frame.

15. (Original) An apparatus according to claim 12, wherein the multiplier multiplies the first data stream with {-*a*,} or { *a*}, *a* being a predetermined constant.

16. (Previously Presented) An apparatus for supporting frame synchronization in a digital communication system, the apparatus comprising:

a constellation mapper configured to map a codeword specifying framing information of a frame according to a signal constellation to output a data stream, wherein the data stream is demultiplexed into a first data stream and a second data stream;

a multiplier coupled to the constellation mapper and configured to modify the first data stream by multiplying the first data stream with {-*a*,} or { *a*}, *a* being a predetermined constant, wherein the sign of the multiplier represents a portion of the framing information; and

a multiplexer configured to combine the modified first data stream with the second data stream, wherein a physical layer signaling header corresponding to the frame is output based the multiplexed data streams.

17. (Previously Presented) An apparatus for supporting frame synchronization in a digital communication system, the apparatus comprising:

a constellation mapper configured to map a codeword specifying framing information of a frame according to a signal constellation to output a data stream, wherein the data stream is demultiplexed into a first data stream and a second data stream;

a multiplier coupled to the constellation mapper and configured to modify the first data stream, wherein bits of the first data stream are interleaved with respective additional bits, the additional bits being phase rotated relative to the bits of the first data stream during modulation; and

a multiplexer configured to combine the modified first data stream with the second data stream, wherein a physical layer signaling header corresponding to the frame is output based the multiplexed data streams.

18. (Original) An apparatus according to claim 12, further comprising:

a code generator coupled to the constellation mapper and configured to generate the codeword according to a first order Reed-Muller code.

19. (Original) An apparatus according to claim 12, wherein the framing information specifies a modulation scheme, and a coding scheme.

20. (Original) An apparatus according to claim 12, further comprising:

a scrambler configured to scramble the multiplexed data streams.

21. (Original) An apparatus according to claim 12, wherein the signal constellation is according to a Binary Phase Shift Keying (BPSK) scheme.

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50. (Previously Presented) A method according to claim 1, wherein the data stream includes a unique word to assist with synchronization.

51. (Previously Presented) An apparatus according to claim 12, wherein the data stream includes a unique word to assist with synchronization.

X. EVIDENCE APPENDIX

Appellants are unaware of any evidence that is required to be submitted in the present Evidence Appendix.

XI. RELATED PROCEEDINGS APPENDIX

Appellants are unaware of any related proceedings that are required to be submitted in the present Related Proceedings Appendix.